

REMARKS

Claims 1-15 are pending in the present application. Claims 11-15 are withdrawn from consideration. Claims 1-10 are rejected. No new matter is herein presented.

Applicants note that the previous 35 U.S.C. §102 rejection of claims 1-4, 6 and 7 over Tolliver (U.S. Patent No. 5,069,964), §103 rejection of claim 5 over Tolliver, and The 35 U.S.C. §103 rejection of claims 8-10 over Tolliver (U.S. Patent No. 5,069,964) in view of Ojeda et al. made of record in the Office Action mailed January 7, 2009 have been withdrawn due to Applicant's amendment in the response filed April 2, 2009.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tolliver et al. (U.S. Patent No. 5,069,964) in view of Buccellato et al. (U.S. Patent Application Publication No. 2002/004135).

The Examiner admits that Buccellato et al. does not explicitly disclose the residual rate or the fall time of the pressure sensitive adhesive as claimed in claims 1-4. However, the Examiner asserts that these properties would be *inherent* because Buccellato et al. uses the same claimed pressure sensitive adhesive, e.g. "cross-linking acrylic copolymer having a functional group" (page 4, paragraph [0035]) and a hardening agent (page 10, paragraph [0113]). The Examiner concludes that it would have been obvious to use the pressure sensitive adhesive of Buccellato et al. as the pressure sensitive adhesive in Tolliver in order to have an adhesive with better weatherability and high shear modulus.

Claims 8-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tolliver in view of Buccellato et al. as applied above, and further in view of Ojeda et al. (U.S. Patent No. 6,326,072).

The Examiner admits that the above combination of Tolliver, Buccellato et al. and Ojeda do not explicitly disclose the Young's modulus or the release film as claimed in claim 9. However, the Examiner asserts that these properties would be *inherent* because the combination of Tolliver, Buccellato et al. and Ojeda uses the "same claimed release film, e.g. unstretched polypropylene film."

Applicants note that the primary basis for the Examiner's assertion and combination of the above-cited references is that the Examiner believes that the material taught therein would inherently exhibit the claimed residual rate and fall time of the pressure sensitive adhesive as in claims 1-4.

It well settled that to establish inherency, the evidence must make clear that the missing descriptive matter is *necessarily present* in the thing described in the reference, and that it would be so *recognized by persons of ordinary skill*. **The mere fact that a certain thing may result from a given set of circumstances is not sufficient. (Emphasis added.)**

Applicants submit it cannot be automatically determined that the residual rates and the fall times of the pressure-sensitive adhesive layer of a similar composition would inherently fall in the ranges of the present invention, and that it is necessary to select the components in the composition and the contents thereof specifically so that the residual rate and the fall time of the pressure-sensitive adhesive layer fall in the ranges of the present invention.

The Examiner asserts that since Buccellato et al. uses a cross-linking acrylic copolymer having a functional group and a hardening agent, these properties would be inherent. Since the features of the present invention cannot be characterized with the resins or the like, the residual rate and the fall time of the pressure-sensitive adhesive layer are specified to particular ranges. And there is a necessity of selecting, among various combinations thereof, a combination that will fall in the range of the present invention. As being recited in Comparative examples, not all of the combinations will fall in the ranges of the present invention even if a cross-linking acrylic copolymer having a functional group and a hardening agent are used.

Applicants submit that the Comparative examples serve for demonstrating that merely similar compositions will not inherently exhibit the claimed functional properties.

As argued in the response to the previous Office Action, it is required to select a combination that fall in the range of the present invention, among various combinations. Presently, applicants provide a more detailed argument as described below.

The pressure-sensitive adhesive layer of the present invention is characterized in that “a residual rate of the pressure-sensitive adhesive layer ranges between 10% and 50% inclusive, and a fall time of the pressure-sensitive adhesive layer ranges between 10 hours and 150 hours inclusive, and is formed of a rubber-based resin or an acrylic resin” (claim 1). That is, it is required that a rubber-based resin or an acrylic resin is used for the pressure-sensitive adhesive and at the same time, the residual rate and the fall time are within the above-described ranges. This is applied also to the case of using a cross-linking acrylic copolymer having a functional group and a hardening agent (claim 6).

The present invention refers to a retroreflective sheet having a groove of the connection part formed on the rear face side, admittedly somewhat similar to Tolliver (US 5,069,964). The present invention further includes a pressure-sensitive adhesive layer on the rear face side, and is adhered to a substrate of aluminum or the like so as to be used as a display board or a signboard for example, as noted in the Specification page 1, lines 10-37.

Applicants note that when air is enclosed during adhesion of the retroreflective sheet to the substrate, the enclosed air expands, and accordingly, undesirable blisters, bubbles, wrinkles and exfoliations may occur to the retroreflective sheet. When adhering while applying some pressure so as to expel the trapped air in order to prevent the problems, if the retroreflective sheet is adhered in a distorted state, problems such as blisters, bubbles, wrinkles, exfoliations or the like occur in the retroreflective sheet due to a residual stress inside the retroreflective sheet, as discussed in the Specification page 2, lines 1-13.

However, when the cohesive power is too high, for example when the holding power is 10 mm/1000 min or less at 100°C as in the pressure-sensitive adhesive of JP3278299, the above-mentioned problems cannot be solved sufficiently. This is noted in the Specification page 2, lines 16-28.

When the cohesive power is lowered to allow the pressure-sensitive adhesive layer to enter the groove easily, cohesive failure of the pressure-sensitive adhesive may be caused, because it cannot resist the stress remaining in the inside of the retroreflective sheet, so that a similar trouble may occur (see Specification page 2, line 29 to page 3, line 13).

The present invention aims to prevent an appearance abnormality of the sheet, such as blisters, bubbles, wrinkles and exfoliations, which may occur over the course of time after the adhesion to a substrate (see Specification page 3, lines 14-18). The inventors have found that, by reducing the air remaining between the retroreflective sheet and the substrate when the retroreflective sheet is adhered, the appearance abnormality of the retroreflective sheet can be prevented. The inventors have found also that, even when the retroreflective sheet is adhered in a distorted state, the appearance abnormality of the retroreflective sheet can be prevented by relaxing a residual stress in the retroreflective sheet by a pressure-sensitive adhesive layer that is disposed on a rear face side of the resin support sheet (see Specification page 5, line 37 to page 6, line 8).

More specifically, the inventors have found that the air remaining at the time of adhesion of the retroreflective sheet can be reduced and the residual stress in the retroreflective sheet after the adhesion can be relaxed by: (1) filling a groove formed during heat press emboss forming, with a pressure-sensitive adhesive layer in advance; (2) specifying a residual rate of the pressure-sensitive adhesive layer in a specific range; and (3) specifying a fall time of the pressure-sensitive adhesive layer in a specific range, thereby leading to the present invention (see Specification page 6, lines 9-17).

The residual rate of the present invention represents a stress relaxation property of the pressure-sensitive adhesive layer. When the residual rate is in the range between 10% and 50% inclusive, a residual internal stress in the retroreflective sheet is relaxed by the pressure-sensitive

adhesive layer, thus preventing an appearance abnormality that occurs over the course of time, such as wrinkles, blisters, bubbles and exfoliations (see Specification page 7, lines 12-21).

The fall time of the present invention represents a cohesive power of the pressure-sensitive adhesive layer. When the fall time is 10 hours or longer, the cohesive power of the pressure-sensitive adhesive layer is strong enough to resist a shrinkage stress of the retroreflective sheet, so that the retroreflective sheet is not shrunk. Moreover, when the fall time is 150 hours or shorter, since the cohesive power of the pressure-sensitive adhesive is not too high, a residual internal stress in the retroreflective sheet is relaxed by the pressure-sensitive adhesive layer, thus preventing an appearance abnormality such as wrinkles, blisters, bubbles and exfoliations (see Specification page 7, lines 22-36).

Applicants note that Buccellato et al. discloses a pressure-sensitive adhesive layer used for a pavement marking article to be adhered on a road surface in use (page 1, paragraph [0003]). FIG. 1 therein shows an example of pavement marking articles, and the pressure-sensitive adhesive layer is disposed on a flat surface. A pressure-sensitive adhesive layer formed of a rubber-based resin or an acrylic resin is disclosed, and use of a cross-linking acrylic copolymer having a functional group and a hardening agent is described.

However, many kinds of resins and hardening agents for the application are described, and the residual rate and the fall time differ depending on the kinds and amounts. Therefore, to obtain the pressure-sensitive adhesive layer of the present invention, it is required to specifically select combinations that fall in the claimed range.

There is a description in the present Specification page 11, lines 23-37 that when a cross-linking acrylic copolymer having a functional group is used to add a hardening agent, the hardening agent is selected so that the pressure-sensitive adhesive layer may have a residual rate and a fall time within the range of the present invention, after forming the pressure-sensitive adhesive layer on the groove of the retroreflective sheet.

Furthermore, there is a description in the Specification page 13, lines 4-8 that the residual rate and the fall time of the pressure-sensitive adhesive layer of the retroreflective sheet of the present invention can be adjusted by forming the pressure-sensitive adhesive layer by determining for example, appropriate kinds and contents of a resin and a hardening agent as materials of the pressure-sensitive adhesive layer.

These recitations indicate that even when an acrylic resin or a rubber-based resin is used, the residual rate and/or the fall time will not be necessarily fall in the ranges of the present invention, depending on the kinds, contents or the like of the resin and the hardening agent.

The pressure-sensitive adhesive layer of Buccellato et al. is considered as having a high loss shear modulus and high storage shear modulus under impact conditions and has better weatherability. However, as recited in JP3278299 and in Comparative Examples 1 and 3, when the cohesive power is too high, the groove cannot be filled sufficiently with the pressure-sensitive adhesive, and the internal stress is not relaxed by the pressure-sensitive adhesive layer. As a result, wrinkles, blisters, bubbles, exfoliations and the like may occur to the main body of the retroreflective sheet.

Comparative Example 1 of the present specification refers to an example of forming a pressure-sensitive adhesive layer similarly to Example 1 by using an acrylic alkyl ester copolymer resin and a hardening agent. However, the residual rate is less than 10% and the fall time exceeds 168 hours. In this example, the cohesive power is too high.

Comparative Example 3 of the present specification refers to an example of forming a pressure-sensitive adhesive layer similarly to Example 1 by using an acryl-vinyl acetate copolymer resin and a hardening agent. Although the residual rate is within the range of the present invention, the fall time exceeds 168 hours. In this example, the cohesive power is too high.

Comparative Example 2 of the present specification refers to an example of forming a pressure-sensitive adhesive layer similarly to Example 1 by using an acrylic resin and a hardening agent, where the acrylic resin has a carboxylic acid as a functional group and chlorinated PP and PE that have been grafted. The residual rate is too high while the fall time is as short as 2 hours, which indicates that the cohesive power is too low.

In conclusion, Comparative Examples 1-3 of the present specification substantially illustrate the invention of Buccellato et al., and demonstrate that the present invention is not inherently reached by Buccellato et al.

Therefore, use of the components recited in Buccellato et al. does not inherently fall in the range of the present invention. Moreover, there is no prompting or suggestion to select the pressure-sensitive adhesive layer corresponding to the range of the present invention.

In addition to that, the pressure-sensitive adhesive layer of Buccellato et al. is used for a pavement marking article provided on the road surface, and thus it is adhered onto the road surface. Such a pressure-sensitive adhesive layer is required to have a high loss shear modulus and high storage shear modulus under impact conditions applied by tires of vehicles or the like, and has better weatherability.

However, there is no description or suggestion about solving problems such as wrinkles, blisters and the like that occur at the time of adhesion on a retroreflective sheet having a groove on the rear face side.

Buccellato et al. fails to provide any motivation to reach for the present invention.

In view of the aforementioned remarks, Applicants submit that the claims are in condition for allowance. Applicants request such action at an early date.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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